

WMML  
Meet #4  
January 9, 2018  
Arithmetic and Number Theory

Name \_\_\_\_\_

School \_\_\_\_\_

1) Evaluate  $16 \div \left(-\frac{2}{3} + 2\right) \left(\frac{1}{4}\right) + 5$

1) \_\_\_\_\_

2) What is the smallest composite number greater than or equal to 4 that is a factor of 291,834,015?

2) \_\_\_\_\_

3) If  $x = 3t^2 + 2t + 1$ , evaluate  $\sqrt{x(2t^2 - 1)}$  when  $t = 3$ . Simplify your answer completely.

3) \_\_\_\_\_

WMML  
Meet #4  
January 9, 2018  
Algebra I

Name \_\_\_\_\_

School \_\_\_\_\_

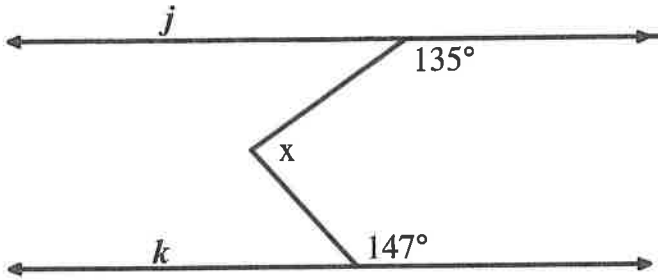
- 1) A number is cut in half and then added to  $\frac{8}{3}$ . This sum is equal to  $\frac{9}{4}$  less than  $\frac{3}{5}$  of the number. What is the number? 1) \_\_\_\_\_
- 2) The force of gravity on the surface of a planet is directly proportional to the mass of the planet and is inversely proportional to the square of the radius of the planet. Planet Wimmel has twice the mass of Earth and  $\frac{1}{3}$  of its radius. If a person weights 100 pounds on Earth, how much does she weigh on Wimmel? 2) \_\_\_\_\_
- 3) Jake took an exam that had 200 multiple choice questions. Each correct answer earned him 4 points and each incorrect deducted 2 points from his score. If he answered every question on the exam and his score was 536, how many questions did he answer incorrectly? 3) \_\_\_\_\_

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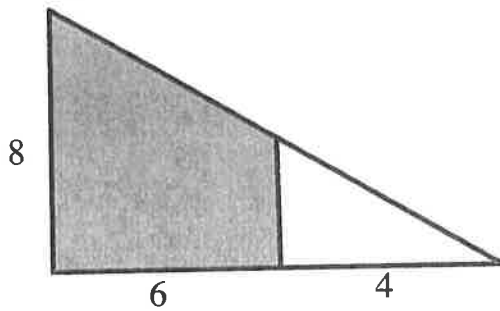
1) Determine the value of  $x$  if  $j \parallel k$

1) \_\_\_\_\_



2) Determine the area of the shaded region. The triangles are both right triangles.

2) \_\_\_\_\_



3) In a right rectangular prism the length, width and height are in the ratio 4:2:1. The volume of the prism is 512 cubic units. What is the surface area of the prism?

3) \_\_\_\_\_

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Algebra II

Name \_\_\_\_\_

School \_\_\_\_\_

1) Factor completely:  $64x^6 - 1$

1) \_\_\_\_\_

2) Simplify  $\left[ (2x^3 + x^2 - 25x + 12) \div (x - 3) \right] \div (2x - 1)$

2) \_\_\_\_\_

3) If  $f(x) = \frac{\sqrt{x}}{2 + \sqrt{x}}$  and  $g(x) = \left( \frac{2x}{1-x} \right)^2$ , compute  $g(f(x))$ .

3) \_\_\_\_\_

Simplify your answer completely.

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Meet #4  
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Trigonometry and Complex Numbers

Name \_\_\_\_\_

School \_\_\_\_\_

1) If  $\tan x + \cot x = \frac{144}{25}$ , determine the value of  $\frac{1}{\tan x} + \frac{1}{\cot x}$ .

1) \_\_\_\_\_

2) Solve for  $x$  if  $0 \leq x < 2\pi$ :  $\sin^2 x + \cos x = -1$

2) \_\_\_\_\_

3) At what values of  $x$  ( $-12 < x < 12$ ), does the graph of  $y = 2\sec\left[\frac{\pi}{6}(x-1)\right] + 3$  have a vertical asymptote?

3) \_\_\_\_\_

Name \_\_\_\_\_

School \_\_\_\_\_

1) For  $A = \begin{bmatrix} 3 & 1 & 0 \\ 6 & 4 & 0 \\ 2 & 3 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 1 & 0 \\ 3 & 3 & 9 \\ 6 & 4 & 6 \end{bmatrix}$ , determine  $B - 2A$

1) \_\_\_\_\_

2) If  $\begin{bmatrix} 3 & 0 & 1 \\ -2 & 3 & 0 \end{bmatrix} \times \begin{bmatrix} a & c \\ -b & a \\ c & b \end{bmatrix} = \begin{bmatrix} 6 & 7 \\ 4 & -3 \end{bmatrix}$ , determine  
the value of  $a + b + c$ .

2) \_\_\_\_\_

3) Solve over the set of real numbers.

$$\det \begin{bmatrix} 2x & 3x-2 & 0 \\ 3 & x & 1 \\ 1-x & 2 & x \end{bmatrix} = 40$$

3) \_\_\_\_\_

WMML  
Meet #4  
January 9, 2018  
Team Round

Name \_\_\_\_\_

School \_\_\_\_\_

1) Several people are standing in a line. Starting from one end, Angie is the 4<sup>th</sup> person in line and from the other end she is the 13<sup>th</sup> person in line. How many people are in the line?

1) \_\_\_\_\_

2) Solve for  $y$  in terms of  $x$ .

$$2x + 2y = 3(4 - 6yx) - 4(-x) - 12y$$

2) \_\_\_\_\_

3) In  $\triangle ABC$ ,  $AB = 5$ ,  $BC = 12$ , and  $\overline{AB} \perp \overline{BC}$ . Determine the distance from  $B$  to  $\overline{AC}$ .

3) \_\_\_\_\_

4) If  $9x^3 + 5x - k$  is divide by  $3x - 2$ , the remainder is  $-2$ . Determine the value of  $k$ .

4) \_\_\_\_\_

5) Determine the exact value of  $\sin(-15^\circ)$

5) \_\_\_\_\_

6) Determine the  $x$ -coordinate of the focus of the conic section given by  $y^2 + 4y - 6x + 22 = 0$ .

6) \_\_\_\_\_